CLAIM + DETAILED DESCRIPTION

[Claim(s)]
[Claim 1] The frame which continued from the same class based on the hierarchical structure of video is extracted as section video. being the method of generating the digest of video by connecting the extracted section video, and making variable the class which extracts said section video -- oh -- the video digest generation method characterized by generating the digest with which ** differ.
[Claim 2] The video storage which memorizes video, and the hierarchical structure storage which memorizes the hierarchical structure of the video memorized by said video storage, a digest -- oh, an input means to input ** was inputted -- oh, [means / to choose from said hierarchical structure storage the class of the section video extracted according to ** / class selection] An extraction section determination means to determine the section extracted from said video storage by using as section video the frame which continues on the class chosen with said class selection means, Video digest generation equipment equipped with the read-out means which reads the video of the determined extraction section from said video storage, and a display means to display the read video.
[Claim 3] A video signal input means to input the video signal of video, and the video storage which memorizes the video inputted from said video signal input means, A hierarchical structure generation means to generate the hierarchical structure of video to the inputted video signal, The hierarchical structure storage which memorizes the hierarchical structure generated with said hierarchical structure generation means, a digest -- oh, an input means to input ** was inputted -- oh, [means / to choose from said hierarchical structure storage the class of the section video extracted according to ** / class selection] An extraction section determination means to determine the section extracted from said video storage by using as section video the frame which continues on the class chosen with said class selection means, Video digest generation equipment equipped with the read-out means which reads the video of

the determined extraction section from said video storage, and a display means to display the read video.

[Claim 4] Video digest generation equipment equipped with the digest picture storing medium which stores the digest picture read with the read-out means in addition to Claim 2 or video digest generation equipment according to claim 3.

[Claim 5] Video digest generation equipment which added the read-out means which reads video from a video storing medium in addition to Claim 2 or video digest generation equipment according to claim 3, and was equipped with at least two read-out means as a whole.

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates the contents of video to the video digest generation method which generates a short time and the digest picture for grasping simply, and its equipment.

[0002]

[Description of the Prior Art] Conventionally, as a means to grasp the contents of video for a short time, by fast forward reproduction of VTR, thinned out the frame equally, and it was displayed, and there was a method of adjusting display speed manually using good gear change reproduction of a jog shuttle dial etc.

[0003]

[Problem to be solved by the invention] However, since fast forward reproduction thinned out a frame equally regardless of an image content, there was a problem that a required frame was excluded or the frame which is not needed on the contrary was displayed.

[0004] On the other hand, although the picture could be displayed in good gear change reproduction at the speed which was adapted for the user's interest and degree of comprehension, there was a problem that all the video covering a long time also had to be operated manually.

[0005] This invention aims at offering the equipment which generates the digest which is easy to grasp the contents of video in view of this point.

[0006]

[Means for solving problem] The video storage which memorizes video in order that this invention may attain the above-mentioned purpose, The hierarchical structure storage which memorizes the hierarchical structure of the video memorized by said video storage, a digest -- oh, an input means to input ** was inputted -- oh, [means / to choose from said hierarchical structure storage the class of the section video extracted according to ** / class selection] An extraction section determination means to determine the section extracted from said video

storage by using as section video the frame which continues on the class chosen with the class selection means, It is the composition equipped with the read-out means which reads the video of the determined extraction section from said video storage, and a display means to display the read video.

[0007] Moreover, it is the composition which was equipped with a video signal input means to input the video signal of video, and a hierarchical structure generation means to generate the hierarchical structure of video to the inputted video signal in addition to the above-mentioned composition.

[0008] Moreover, they are the digest picture storing medium which stores the digest picture which was read with the video read-out means in addition to the above-mentioned composition, and the composition equipped with at least two video read-out means.

[0009]

[Function] By the above composition, this invention extracts the frame which continued from the same class based on the hierarchical structure of video as section video. making variable the class which generates the digest of video by connecting the extracted section video, and extracts section video -- oh, the digest with which ** differ is generated.

[0010]

[Working example] Below, the 1st work example of the video digest generation equipment in this invention is explained. The block diagram of this example is shown in drawing 1 . this example reads into the class selection means 5 the hierarchical structure information memorized by the hierarchical structure storage 2 -- oh [digest] -- from the ** input means 7 -- oh, based on a ** input, the class selection means 5 chooses the information on a specific class from the read hierarchical structure information, and outputs it to the extraction section determination means 6. With the extraction section determination means 6, the section which extracts the video of several frames which continues based on the information on the inputted specific class is determined. A video digest is generated by reading from the video storage 1, beginning to read two or more determined section video one by one, and displaying it on the display means 4 by a means 3. Operation of this example is explained in more detail below.

[0011] Drawing 2 shows the hierarchical structure of video. Video can be expressed by a hierarchical structure called a frame, a shot, a cut, and a scene in this way. The lowest layer is a frame and a frame is the picture of one sheet photoed at the video rate. A shot is what made two or more frames the bundle, and it can collect by camera work. Cuts are ** photoed after starting recording before ending, and accumulating video, and it consists of two or more shots. The cut of the same contents is summarized with a scene. The above hierarchical structure is memorized to the hierarchical structure storage 2. As an example of concrete hierarchical structure information, it is a memory address on the video storage 1 with which each shot, the cut, and the head frame and termination frame of the scene are memorized. Furthermore, you

may have the memory address representing each shot, a cut, and a scene of a frame as information on a hierarchical structure. Such hierarchical structure information may be given by an automatic method, or may be inputted manually.

[0012] oh [digest] -- the ** input means 7 -- oh -- as the input of ** -- for example -- "-- oh -- it is -- " -- the three-stage of "about "it is fine" inside" -- oh, ** is inputted. oh [from the hierarchical structure information read from the hierarchical structure storage 2 with the class selection means 5 / digest] -- the three-stage inputted with the ** input means 7 -- oh, the information on a specific class is chosen based on a ** input. for example, -- "-- oh -- it is -- " -- the information on a cut class, and when are inputted and the information on a scene class and "about inside" are inputted, and "it is fine" is inputted, the information on a shot class is chosen and it outputs to the extraction section determination means 6.

[0013] The case where the information on a cut class was chosen from the class selection means 5, and it is inputted about operation of the extraction section determination means 6 is made into an example, and it explains. With the extraction section determination means 6, the section which extracts the video of several frames which continued from each cut based on the information on a cut class is determined. the method of some determination methods of the extraction section being considered and extracting a predetermined frame number from the head of a cut -- or there is a method of extracting the middle predetermined frame number of a cut. Moreover, when it has the frame information which represents a cut as information on a hierarchical structure, you may determine the extraction section that a representation frame is included based on a representation frame.

[0014] The read-out means 3 and the display means 4 read the picture of the extraction section determined with the extraction section determination means 6 from the video storage 1, and display it.

[0015] when generating the digest which shortened the contents of video by this example as mentioned above, a user wishs by changing the class which extracts section video based on the hierarchical structure of video -- it becomes oh, possible to generate the digest of **.

[0016] In addition, although the video storage 1 and the hierarchical structure storage 2 were illustrated like a different storage by drawing 1 at this example, you may memorize video and a hierarchical structure on the same storage. moreover -- this example -- oh [digest] -- oh which is inputted from the ** input means 7 -- ** -- "-- oh -- it is -- " -- although explained as a three-stage "to the extent that inside "it is fine"", you may increase a stage more. for example, -- "-- oh -- it is -- " -- when one more step is increased in between ["to the extent that inside"], it can respond by thinning out the cut which extracts section video. Moreover, the time length of the digest to generate can also be freely set up by making variable the frame number extracted as section video in the extraction section determination means 6.

[0017] Next, the 2nd work example of the video digest generation equipment in this invention is

explained. The block diagram of this example is shown in drawing 3 . The same number is given to the same thing as drawing 1 by drawing 3 , and explanation is omitted. As for 8, in drawing 3 , a hierarchical structure generation means and 10 are camera information input means a video signal input means and 9.

[0018] The 2nd work example is characterized [main] by having the video signal input means 8 and a hierarchical structure generation means 9 to generate the hierarchical structure of video in addition to the composition of the video digest generation equipment of the 1st work example. That is, this example is equipped with a means to generate and record the hierarchical structure of video required when recording a video signal, in order to generate a video digest, in equipment equipped with photographing functions, such as a video camera.

[0019] With the hierarchical structure generation means 9, the hierarchical structure explained by drawing 2 of the 1st work example is generated automatically. In the case of a video camera, automatic generation of a hierarchical structure is explained. In a video camera, information required in order to generate a hierarchical structure can be acquired from a direct camera. That is, it performs generating a hierarchical structure using the camera information in the midst of photoing video with a video camera.

[0020] It performs dividing the continuous frame into a shot based on camera work. Camera works are zoom operation and pan-operation, and show the example which divided into five shots the frame which follows drawing 4 by zoom operation and pan-operation. Here, pan-operation is carried out in the operation to which zoom magnifying power is made to increase in (2), and (4). In a video camera, the section of (2) can be known from the information which drives the zoom lens for making zoom magnifying power increase. Moreover, about pan-operation, it can know from the sensor which detects a motion of a camera. Therefore, with the hierarchical structure generation means 9, a frame is divided into a shot like drawing 4 by inputting zoom lens drive information and the sensor information which detects a motion of a camera from the camera information input part 10 of drawing 3 .

[0021] Integration to the cut from a shot is performed based on the recording start / red light from a camera. That is, since it becomes a cut from two or more shots photoed after starting recording before stopping, By inputting a recording start / red light of a camera into the camera information input means 10, a shot after carrying out a recording start with the hierarchical structure generation means 9 until it stops is summarized as a cut.

[0022] About the method of unifying a cut and making it into a scene, there are some which inventors showed to Tokuganhei5-257121, for example. This method is explained briefly. Photography time is used for unifying on a scene from a cut. That is, two cuts are unified when the difference of the photography time of the last frame of a pre- cut and the photography time of the head frame of the next cut is below a predetermined value in an adjoining cut. That is, the cut with near photography time is the view of being the same scene. Therefore, by

inputting photography time, a cut is unified for the camera information input means 10 with the hierarchical structure generation means 9, and it is made it with a scene.

[0023] With equipment equipped with a photographing function like a video camera as mentioned above, camera information can be acquired and a hierarchical structure can be generated. A hierarchical structure is generated and the memory address on the video storage 1 with which the information showing a hierarchical structure, i.e., a scene, a cut, and each head frame and termination frame of the shot are memorized is memorized to the hierarchical structure storage 2. Moreover, to memorize the memory address on the video storage 1 of the frame which represents a scene, a cut, and a shot further as hierarchical structure information, it is necessary to have a means to extract a representation frame. There are some which inventors showed to Tokuganhei6-140128 about a means to extract this representation frame.

[0024] arbitrary [read the information on a hierarchical structure and] -- oh, about operation which generates the digest of **, it is completely the same as the 1st work example, and explanation is omitted.

[0025] As mentioned above, by generating the hierarchical structure of video and memorizing to the storage with video, when photoing video with the equipment equipped with photographing functions, such as a video camera, in this example arbitrary [based on a hierarchical structure] after photography -- it becomes oh, possible to generate the digest of ** immediately.

[0026] Next, the 3rd work example of the video digest generation equipment in this invention is explained. The block diagram of this example is shown in drawing 5 . The same number is given to the same thing as drawing 3 by drawing 5 , and explanation is omitted. In drawing 5 , 11 is a camera operation presumption means.

[0027] Although the 3rd work example is almost the same as the composition of the video digest generation equipment of the 2nd work example, in the 2nd work example, it differs in that presume camera operation from a video signal and a hierarchical structure is generated by the 3rd work example to having inputted camera information and having generated the hierarchical structure. That is, this example explains the generation method of a hierarchical structure in case camera information is not acquired directly. In this case, it is necessary to presume the operation information on a camera from a video signal.

[0028] With the camera operation presumption means 11, camera operation required in order to generate a hierarchical structure is presumed from a video signal. Camera operations of presuming here are the camera work for detecting a shot, the recording start / stop for detecting a cut, and the cut integrated information for detecting a scene.

[0029] Camera works are zoom operation and pan-operation, and camera work can be presumed by detecting the motion vector of a picture from a video signal. About a detailed method, the method shown in JP,H6-165107,A (Tokuganhei4-317267) can be used.

[0030] The presumed method can detect a recording start / stop from a video signal, when various idea **** ask for a histogram within a frame about the brightness of a video signal and ask for inter-frame difference about this histogram as an example. That is, on the boundary of a recording start / stop, it is because image contents differ greatly, so an inter-frame difference value becomes large.

[0031] Although the information which unifies a scene from a cut used photography time in the 2nd work example, since photography time is undetectable, from a video signal, it uses the image characteristic quantity in a cut. The color characteristic quantity which exists in common with each frame in the same cut is detected using color characteristic quantity as an example of image characteristic quantity.

[0032] After presuming camera operation with the camera operation presumption means 11 as mentioned above, the method of generating a hierarchical structure with the hierarchical structure generation means 9 is almost the same as what was explained in the 2nd work example, but only a little different portion is explained.

[0033] As for the integration to the cut from a shot, the case where an inter-frame difference value exceeds a predetermined value is a cut change, and the shot between cut changes is summarized. The method of unifying a cut and making it into a scene makes a cut a scene collectively [the method] by unifying two cuts, when similar by the cut which color characteristic quantity adjoins. After hierarchical structure generation memorizes hierarchical structure information to the hierarchical structure storage 2. Operation until it generates a digest is the same as that of the 2nd work example after this, and explanation is omitted.

[0034] as mentioned above, arbitrary [by generating the hierarchical structure of video and memorizing to a storage with video / after record / based on a hierarchical structure] in this example, when only a video signal is inputted and camera information is not acquired -- it becomes oh, possible to generate the digest of ** immediately.

[0035] Next, the 4th work example of the video digest generation equipment in this invention is explained. The block diagram of this example is shown in drawing 6 . In addition, although the composition of the 4th work example shown in drawing 6 adds a new means on the basis of the video digest generation equipment of the 1st work example, it may add the same means as the composition of the 2nd work example and the 3rd work example similarly. Although only the composition based on the 1st work example is explained here, other composition is the same and explanation is omitted.

[0036] This example is the composition of having added the digest picture storing medium 13 for storing the video digest generated in the same operation as the video digest generation equipment of the 1st work example, and the write-in means 12 and the read-out means 14. In the composition of this example, the section video read from the video storage 1 by the read-out means 3 is stored in the digest picture storing medium 13 at ** used as the video which

continued by the write-in means 12. The read-out means 14 is reading the video stored in the digest picture storing medium 13, and displaying on the display means 4, and generates a video digest.

[0037] [the feature of this example] by reading and displaying, after extracting the section video for generating a digest picture from the video stored in the video storage and recording the extracted section video on a digest picture storing medium Video digest generation of the natural display which is comfortable in a part for the terminal area of the extracted section video and section video is enabled.

[0038] Next, the 5th work example of the video digest generation equipment in this invention is explained. The block diagram of this example is shown in drawing 7 . Although the composition of the 5th work example shown in drawing 7 is read on the basis of the video digest generation equipment of the 1st work example and adds a means, it may be similarly read to the composition of the 2nd work example and the 3rd work example, and may add a means. Although only the composition based on the 1st work example is explained here, other composition is the same and explanation is omitted.

[0039] This example is characterized by having two or more means which read section video from the video storage 1, and has composition which reads and serves as a means 15-1 from two of 15-2 in drawing 7 . The section video for generating a digest picture is extracted from the video stored in the video storage by reading like this example and having two or more means. This extracted section video is read, and when reading and displaying with a means, generation of the video digest of the natural display which is comfortable in a part for the terminal area of the extracted section video and section video is enabled. While [namely,] having read a certain section video by the read-out means 15-1 The read-out means 15-2 is made to stand by in the location of the video storage with which the image data of the head frame of the following section video is memorized. When a read-out means 15-2 by which it is standing by when read-out of the section video which the read-out means 15-1 has read is ended starts read-out, the video digest of a natural display is generated.

[0040]

[Effect of the Invention] According to this invention, the section video which consists of two or more frames which continues from the same class based on the hierarchical structure of video is extracted as mentioned above. making variable the class which connects the extracted section video, generates the digest of video, and extracts section video -- oh, the digest with which ** differ is generable.

[0041] moreover, the thing for which the hierarchical structure of video is generated and recorded with video when recording video -- after video record -- oh, the digest with which ** differ is generable.

[0042] Furthermore, generation of the video digest of a natural display is enabled by storing

the generated digest picture in a video storing medium, or reading section video from a video storing medium using two or more video read-out means, and displaying a video digest.

[Translation done.]